

PROPOSED STATE IMPLEMENTATION PLAN REVISION

TENNESSEE VALLEY AUTHORITY (TVA) PARADISE FACILITY MUHLENBERG COUNTY, KENTUCKY

SO₂ Emission Limits

PURPOSE

The Kentucky Environmental and Public Protection Cabinet is proposing a revision to the Commonwealth's State Implementation Plan (SIP). In *Federal Register* notice 35326 dated August 25, 1989, U.S. EPA approved a redistribution of allowable sulfur dioxide emissions at the Tennessee Valley Authority (TVA) Paradise Steam Plant located in Muhlenberg County, Kentucky. The effective date of this action was September 25, 1989.

This source specific revision for the Tennessee Valley Authority (TVA) Paradise plant will remove the

O-87-012 operating permit from Kentucky's SIP and replace it with emission limitations for units at the Paradise facility that are overall, slightly more stringent than those incorporated in the aforementioned permit. Specifically, this revision will alter the unit-specific sulfur dioxide emission limits for the units at the facility.

PLANT SPECIFICS

The Paradise Steam Plant is a three unit coal-fired facility operated by the Tennessee Valley Authority, located in Muhlenberg County. The facility consists of three cyclone-fired boilers and ancillary support equipment including heating boilers, cooling towers and material handling equipment. All three coal-fired boilers are equipped with staged overfired air and selective catalytic reduction modules for nitrogen oxides control. Boiler Units 1 and 2 are equipped with venturi-type limestone slurry flue gas desulfurization (FGD) scrubbers. Boiler Unit 3 is equipped with an electrostatic precipitator and a wet limestone FGD scrubber. Units 1 and 2 have a nominal electric generating capacity of 704 megawatts (MW) each. Unit 3 has a nominal electric generating capacity of 1150 MW.

Muhlenberg County is currently classified in 40 CFR Part 81 as attainment for both the primary and secondary National Ambient Air Quality Standards (NAAQS) for sulfur dioxide. The area had previously been designated as nonattainment for the secondary SO₂ standard but was redesignated by U.S. EPA as attainment effective October 19, 1998. (*FR notice dated August 18, 1998*)

BACKGROUND

On June 29, 1987, the Kentucky Natural Resources and Environmental Protection Cabinet submitted a source specific State Implementation Plan revision to U.S. EPA to redistribute allowable sulfur dioxide emissions at the TVA, Paradise Steam Plant located in Muhlenberg County. In a *Federal Register* notice dated August 25, 1989, U.S. EPA granted approval of that source specific SIP amendment, with an effective date of September 25, 1989. The redistribution allowed for the following emission rates for SO₂ at the Paradise facility.

TABLE 1
Paradise Emission Rate Limits
1989 SIP Revision

Unit #	Emission Rate
Unit #1	1.2 lb/MMBTU
Unit #2	1.2 lb/MMBTU
Unit #3	5.4 lb/MMBTU

This revision provided unit-specific sulfur dioxide (SO₂) emission limits of 1.2 lb/MMBTU for Units 1 and 2 and 5.4 lb/MMBTU on Unit 3. These limits were an averaged equivalent to the 3.1 lb/MMBTU emission limit requirement specified for each unit prior to the approval of the revision. The 1989 approval was based on modeling that demonstrated that the ambient air quality standards continued to be protected when the plant was operated at the revised emission limits.

CURRENT ACTIVITY

Based on the most recent information available it is possible for the Paradise facility to meet the previously set 1.2 lb/MMBTU limit on both Units 1 and 2, and meet a more stringent level of 1.2 lb/MMBTU on Unit 3, unless for an operational maintenance period, not to exceed 720 hours in any 12-month period, when the scrubber on Unit 3 may be bypassed. In these cases, on any consecutive 12 month period, the emission limit for that time period would be the 3.1 lb/MMBTU level required by 401 KAR 61:015, Section 5(1). This revision will remove the 1989 amendment to Kentucky's State Implementation Plan which incorporated the above stated emission limits found in O-87-012 issued on June 29, 1987, and replace it with the following unit specific emission limits which are more stringent than those found in the previously cited permit. These new, more stringent limits will be incorporated into the Title V Operating Permit for the Paradise Facility. The new allowable emission rates are listed below in Table 2.

TABLE 2
New Emission Rates
TVA – Paradise Facility

Unit #	Emission rate (averaging period -- 24 hour)
Unit #1	1.2 lb/MMBTU
Unit #2	1.2 lb/MMBTU
Unit #3*	1.2 lb/MMBTU or 3.1 lb/MMBTU

ANALYSIS

A clear reading of emission rate requirements found in 401 KAR 61:015 would allow an emission rate of 3.1 lb/MMBTU for each unit at the Paradise facility. However, with the establishment of the 1989 alternative unit emission rates approved incorporated into Kentucky's SIP, reverting back to the 3.1 pound rate could be construed as a slight weakening of currently applicable requirements.

Several scenarios were reviewed in an effort to ascertain the potential differences in allowable emission rates using historic, average, and conservative heat input rates to calculate and compare potential allowable emission rates. Appendix A provides information that shows allowable potential

and projected overall sulfur dioxide emission levels from the Paradise facility will decrease with this revision, once approved by U.S. EPA.

MONITORING / RECORD KEEPING / REPORTING REQUIREMENTS

In order to ensure adherence with these revised emission rates, the facility has numerous monitoring, record keeping and reporting requirements.

Records shall be kept in accordance with 401 KAR 61:005, Section 3, Emission Monitoring and 61:015, Section 6, Monitoring of Operations; with the exception that the records shall be kept for a period of five (5) years.

Detailed monitoring, record keeping and reporting requirements are outlined for emission points 1, 2 and 3 in Section B of the Title V operating permit, being issued for the Paradise Facility. Specifically, the following requirements ensure adherence with the revised emission limitations and are included in Appendix B. Additionally, Section F of the permit includes generally applicable monitoring, recordkeeping and reporting requirements .

V-07-018 Section B

Units 1 & 2

Monitoring Requirements	4.a. and 4.c.
Recordkeeping Requirements	5.a. and 5.b.
Reporting Requirements	6.a.

Unit 3

Monitoring Requirements	4.d., 4.f., and 4.i.
Recordkeeping Requirements	5.a., 5.b., and 5.f.
Reporting Requirements	6.a(i), a(iii), a(iv), a(v)., and 6.d.

APPENDIX A

**Considerations for Appropriate
Heat Input Rates to Calculate Projected Emissions**

for
**TVA Paradise
Muhlenberg County, Kentucky
Source Specific SIP Revision
SO₂ Limits**

July 2007

APPENDIX A

Considerations for Appropriate Heat Input Rates to Calculate Projected Emissions

	Highest 24-hr average heat input reported by TVA in mmBtu/hr	Ten percent factor	Conservative 24-hr avg. heat input in mmBtu/hr	Average 1-hr heat input in years 1990-1995 in mmBtu/hr	Heat input rate from SIP operating permit in mmBtu/hr
Unit 1	7,256	1.1	7982	6,023	6,305
Unit 2	7,772	1.1	8549	6,247	6,305
Unit 3	13,035	1.1	14339	8,530	10,390

	Emission rate lb/mmBtu	Heat input (mmBtu/hr)	Emissions lb/hr	Total (lb/hr)
<i>Previous Permit Calculation</i>				
Unit 1	1.20	6305	7566	
Unit 2	1.20	6305	7566	
Unit 3	5.40	10390	56106	
Total				71,238

<i>Underlying Rule Calculation</i>				
Unit 1	3.10	6305	19546	
Unit 2	3.10	6305	19546	
Unit 3	3.10	10390	32209	
Total				71,300

<i>Proposed New Allowable Emission Rates using Conservative Heat input rates</i>				
Unit 1	1.20	7982	9578	
Unit 2	1.20	8549	10259	
Unit 3	1.20	14339	17207	
Total				37,044

<i>Estimate of future actual annual emissions using conservative Heat input</i>				
Unit 1	0.80	7982	6386	
Unit 2	0.80	8549	6839	
Unit 3	0.25	14339	3585	
Total				16,810

APPENDIX B

Monitoring / Record Keeping & Reporting Requirements

For
**TVA Paradise
Muhlenberg County Kentucky
Source Specific SIP Revision
SO₂ Limits**

July 2007

APPENDIX B

Monitoring, Recordkeeping & Reporting Provisions from V-07-018

Units 1 & 2

4. Specific Monitoring Requirements:

- a. Pursuant to 401 KAR 61:005, Section 3 and Performance Specification 2 of Appendix B to 40 CFR 60 or 40 CFR 75, Appendix A, and 401 KAR 52:020, Section 26, continuous emission monitoring (CEM) systems shall be installed, calibrated, maintained, and operated for measuring sulfur dioxide emissions and either oxygen or carbon dioxide emissions. If any 24-hour average sulfur dioxide value exceeds the standard, the permittee shall, as appropriate, initiate an investigation of the cause of the exceedance and/or the CEM system and make any necessary repairs or take corrective actions as soon as practicable.
- c. Pursuant to 401 KAR 61:015, Section 6(3) the rate of each fuel burned shall be measured daily and recorded. The heating value and ash content of fuels shall be ascertained at least once per week and recorded. The average electrical output, and the minimum and maximum hourly

5. Specific Recordkeeping Requirements:

- a. Records shall be kept in accordance with 401 KAR 61:005, Section 3(16)(f) and 61:015, Section 6, with the exception that the records shall be maintained for a period of five years.
- b. Records of the following shall be maintained:
 - (i) data collected either by the continuous monitoring systems or as necessary to convert monitoring data to the units of the applicable standard;
 - (ii) the results of all compliance tests;
 - (iii) fuel analyses;
 - (iv) the rate of fuel burned for each fuel on a daily basis;
 - (v) the heating value and ash content on a weekly basis; and,
 - (vi) the average electrical output and the minimum and maximum hourly generation rate on a daily basis.

6. Specific Reporting Requirements:

- a. Pursuant to 401 KAR 61:005, Section 3 (16), minimum data requirements which follow shall be maintained and furnished in the format specified by the Division.

- (i) Owners or operators of facilities required to install continuous monitoring systems for sulfur dioxide or those utilizing fuel sampling and analysis for sulfur dioxide emissions shall submit for every calendar quarter, a written report of excess emissions and the nature and cause of the excess emissions if known. The averaging period used for data reporting should correspond to the emission standard averaging period which is a twenty-four (24) hour averaging period. All quarterly reports shall be postmarked by the thirtieth (30th) day following the end of each calendar quarter.
- (ii) For gaseous measurements, the summary shall consist of hourly averages in the units of the applicable standard. The hourly averages shall not appear in the written summary, but shall be provided in electronic files only.
- (iii) The date and time identifying each period during which the continuous monitoring system was inoperative, except for zero and span checks, and the nature of system repairs or adjustments shall be reported. Proof of continuous monitoring system performance whenever system repairs or adjustments have been made is required.
- (iv) When no excess emissions have occurred and the continuous monitoring system(s) have not been inoperative, repaired, or adjusted, such information shall be included in the report.

Unit 3

4. **Specific Monitoring Requirements:**

- d. Pursuant to 401 KAR 61:005, Section 3 and Performance Specification 2 of Appendix B to 40 CFR 60 or 40 CFR 75, Appendix A, and 401 KAR 52:020, Section 26, continuous emission monitoring (CEM) systems shall be installed, calibrated, maintained, and operated for measuring sulfur dioxide emissions and either oxygen or carbon dioxide emissions. If any 24-hour average sulfur dioxide value exceeds the standard, the permittee shall, as appropriate, initiate an investigation of the cause of the exceedance and/or the CEM system and make any necessary repairs or take corrective actions as soon as practicable.
- f. Pursuant to 401 KAR 61:015, Section 6(3) the rate of each fuel burned shall be measured daily and recorded. The heating value and ash content of fuels shall be ascertained at least once per week and recorded. The average electrical output, and the minimum and maximum hourly generation rate shall be measured and recorded daily.
- i. The duration of any scrubber by-pass shall be monitored.

5. **Specific Record Keeping Requirements:**

- a. Records shall be kept in accordance with 401 KAR 61:005, Section 3(16)(f) and 61:015, Section 6, with the exception that the records shall be maintained for a period of five years.
- b. Records of the following shall be maintained:
 - (i) data collected either by the continuous monitoring systems or as necessary to convert monitoring data to the units of the applicable standard;
 - (ii) the results of all compliance tests;
 - (iii) percentage of the COM data (excluding exempted time periods) showing excursions above the opacity standard and the opacity indicator level;
 - (iv) fuel analyses;
 - (v) the rate of fuel burned for each fuel on a daily basis;
 - (vi) the heating value and ash content on a weekly basis; and,
 - (vii) the average electrical output and the minimum and maximum hourly generation rate on a daily basis.
- f. The duration of any scrubber by-pass shall be recorded.

6. **Specific Reporting Requirements:**

- a. Pursuant to 401 KAR 61:005, Section 3 (16), minimum data requirements which follow shall be maintained and furnished in the format specified by the Division.
 - (i) Owners or operators of facilities required to install continuous monitoring systems for sulfur dioxide or those utilizing fuel sampling and analysis for sulfur dioxide emissions shall submit for every calendar quarter, a written report of excess emissions and the nature and cause of the excess emissions if known. The averaging period used for data reporting should correspond to the emission standard averaging period averaging period which is a twenty-four (24) hour averaging period. All quarterly reports shall be postmarked by the thirtieth (30th) day following the end of each calendar quarter.
 - (iii) For gaseous measurements, the summary shall consist of hourly averages in the units of the applicable standard. The hourly averages shall not appear in the written summary, but shall be provided in electronic files only.
 - (iv) The date and time identifying each period during which the continuous monitoring system was inoperative, except for zero and span checks, and the nature of system repairs or adjustments shall be reported. Proof of continuous monitoring system performance whenever system repairs or adjustments have been made is required.
 - (v) When no excess emissions have occurred and the continuous monitoring system(s) have not been inoperative, repaired, or adjusted, such information shall be included in the report.
- d. The permittee shall include in the semi-annual report required by Section F.5, the duration in hours of any scrubber by-pass based on a 12 month rolling total.

APPENDIX C

Public Hearing Notice & Response to Comments Received

For
**TVA Paradise
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